What is claimed is:

1) An article for passively converting energy from one form to another comprising;
a graded composite of carbon-bonded carbon fiber material,
carbon foam,
at least one working surface, and
at least one secondary surface,
wherein said graded composite of carbon-bonded carbon fiber material performs energy conversion at said working surface and said carbon foam provides a thermally conductive path between said working surface and said secondary surface of said article.

2) An article in accordance with claim 1 wherein said energy conversion comprises at least one of the following:
a) the conversion of RF energy to sensible heat;
b) the conversion of absorbed radiant energy to sensible heat;
c) the conversion of sensible heat to radiant energy; and,
d) the conversion of electron kinetic energy to sensible heat.

3) An article in accordance with claim 1 wherein said carbon-bonded carbon fiber material comprises carbon fibers having individual lengths generally not more than about 1 mm and individual diameters generally not more than about 25 μm.

4) An article in accordance with claim 1 wherein said carbon foam comprises a pitch-derived graphitic foam having interconnected pores and an average pore diameter less than about 1 mm.

5) An article in accordance with claim 1 wherein said carbon-bonded carbon-fiber material substantially fills the pores of said carbon foam on said working surface to a depth of at least one pore diameter.

6) An article in accordance with claim 1 wherein the thickness of said carbon-bonded

carbon-fiber material varies in at least one direction along said working surface.

7) An article in accordance with claim 6 wherein said article comprises a microwave load and said thickness variation forms a tapered impedance element.

8) An article in accordance with claim 1 wherein said carbon foam is at least partially infiltrated on said secondary surface with a metal selected from the group consisting of Cu, Al, Ni, and their alloys.

9) A process for preparing a passive energy-converting composite article comprising the steps of:
   a) blending carbon fibers with a carbonizable organic powder to form a mixture;
   b) dispersing said mixture into an aqueous slurry;
   c) vacuum molding said aqueous slurry onto at least one working surface of a carbon foam body to form a green article;
   d) drying and curing said green article to form a cured article; and,
   e) carbonizing said cured article at a temperature of at least about 1000°C to form an adherent carbon-bonded carbon fiber material grading into said carbon foam on said working surface, said composite article having a bulk density less than 1 g/cm^3.

10) A process in accordance with claim 9 wherein carbon-bonded carbon fiber material comprises carbon fibers derived from a fibrous material selected from the group consisting of rayon, polyacrylonitrile, pitch, and mesophase pitch.

11) A process in accordance with claim 9 wherein said carbon foam is a graphitic foam.

12) A process in accordance with claim 9 further comprising the additional step:
   f) graphitizing the carbonized article at a temperature of at least 2400°C.

13) A process for preparing a passive energy-converting composite article comprising the steps of:

a) blending carbon fibers with a carbonizable organic powder to form a mixture;

b) dispersing said mixture into an alcohol solution;

c) molding said alcohol slurry onto at least one working surface of a carbon foam body to form a green article;

d) drying and curing said green article to form a cured article; and,

e) carbonizing said cured article at a temperature of at least about 1000°C to form an adherent carbon-bonded carbon fiber material grading into said carbon foam on said working surface, said composite article having a bulk density less than 1 g/cm^3.

14) A process for preparing a composite article in accordance with claim 13 wherein said carbon-bonded carbon fiber material comprises carbon fibers derived from a fibrous material selected from the group consisting of rayon, polyacrylonitrile, pitch, and mesophase pitch.

15) A process for preparing a composite article in accordance with claim 13 wherein said carbon foam is a graphitic foam.

16)A process for preparing a composite article in accordance with claim 13 further comprising the additional step of: f) graphitizing the carbonized article at a temperature at least 2400°C.

17) A process for preparing a composite article in accordance with claim 14 wherein said carbon fibers have individual diameters generally not more than about 25 μm and individual lengths generally not more than about 1 mm.

18) A process in accordance with claim 13 wherein said carbonizable organic material is selected from the group consisting of pitch and thermosetting resin.

19) A process in accordance with claim 18 wherein said thermosetting resin comprises a phenolic resin.

20) A process in accordance with claim 19 wherein said phenolic resin comprises a mixture of novolac and hexamethylenetetramine.

21) A process for preparing a composite article in accordance with claim 13 further comprising the additional step of machining said composite article to final dimensions.

22) A process for preparing a composite article in accordance with claim 13 further comprising the additional step of:

g) infiltrating a portion of said carbon foam with a metal on at least one selected secondary surface of said foam.